

(19)



Europäisches Patentamt

European Patent Office

Office européen des brevets



(11) Publication number:

**0 607 568 A1**

(12)

**EUROPEAN PATENT APPLICATION**

(21) Application number: 93120043.0

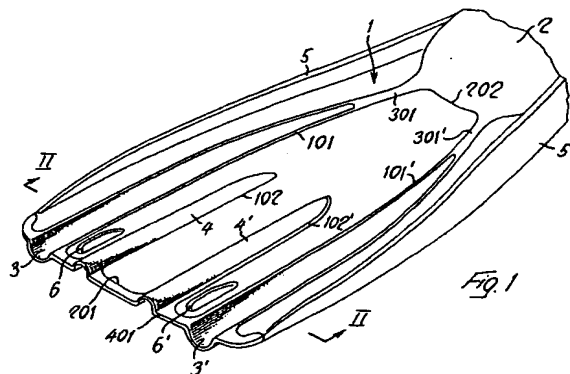
(51) Int. Cl.<sup>5</sup>: **A63B 31/11**

(22) Date of filing: 13.12.93

(30) Priority: 20.01.93 IT GE930002

(43) Date of publication of application:  
27.07.94 Bulletin 94/30(54) Designated Contracting States:  
AT BE CH DE DK ES FR GB GR IE LI LU MC  
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**I-16124 Genova (IT)**(54) **Swimming flipper.**

(57) Swimming flipper of the type in which the flipper part (1) has at least two or more channels (3,3',4,4') for restricting and directing the streams of fluid generated during swimming, characterized in that said channels (3,3',4,4') are made with opposite concavities.

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The present invention relates to swimming flippers and especially to flippers of the type in which the flipper part has two or more channels for restricting and directing the streams of fluid generated during swimming.

More specifically, but not exclusively, the invention relates to flippers of the type described above, in which said channels are made in a more pliable material than that of the rest of the flipper part.

The main drawback of known flippers of the type mentioned above is that said channels cause an excessive deformation or "elastic yielding" of the flipper part when the flipper stroke is in a direction which coincides with the concavity of said channels, whereas when the flipper stroke is in the opposite direction, the flipper part tends to become excessively rigid.

Therefore, the main aim of the present invention is to overcome the abovementioned drawbacks inherent in known flippers.

In accordance with the main feature of the present invention, the channels in a swimming flipper in which the flipper part has at least two flow channels, are made with opposite concavities.

Advantageously, according to a preferred embodiment of the present invention, the flippers have four adjacent channels on each flipper part, the two centre-most channels being made with opposite concavities relative to those of the two side channels.

According to an additional feature of the invention, in the case of a flipper with three or more channels, the central channels are preferably made narrower than the side channels in order to limit even further the "elastic yielding" of the flipper part.

Further features and advantages of the flipper according to the invention will emerge more clearly on reading the following description of certain preferred embodiments of said flipper, said description being made with reference to the appended drawings in which:

Figure 1 is a perspective view of a swimming flipper having four flow channels according to the invention, in which the shoe part of the flipper has been partially cut away.

Figure 2 is a cross-section along the line II-II of Figure 1, and

Figure 3 is a cross-section, similar to that of Figure 2, of an embodiment of a flipper having three flow channels.

With reference to the drawings, and with particular reference to Figures 1 and 2 thereof, the flipper illustrated is of the type comprising a flipper part 1, obtained by moulding a relatively rigid material, joined by means of a further moulding operation to a shoe part 2 which is made of a softer

material, of the consistency of rubber.

The flipper part 1 has slits 101, 101', 102, 102' formed in it which extend from the leading edge 201 of the flipper part 1 towards the middle in the direction of the base part 202 of said flipper part 1.

The flow channels 3, 3', 4, 4' are formed inside these slits 101, 101', 201, 201' by moulding using the same material as that used to mould the shoe part 2. Advantageously, the material used to form the flow channels 3, 3' is directed into the rear ends of the side slits 101, 101' at the time of moulding of the shoe 2, via injection ducts 301 formed in the flipper part 1, and comes out of the front of these side slits 101, 101' after having formed the flow channels 3, 3' by running along a front duct formed between the front end of the mould and the leading edge of the flipper, where it forms the front edge 401, then travelling as far as the two central slits 102, 102', at which point it forms the flow channels 4, 4'.

In accordance with the invention, the flow channels 4, 4' have an opposite concavity to that of the flow channels 3, 3', as clearly illustrated in Figures 1 and 2. The flipper is completed in the usual way by the two side ribs 5, 5' and has a series of small fins 6, 6', 7 which, in addition to stabilizing the flipper during swimming, are also used to help position the flipper part 1 correctly in the mould in which the shoe part is injected, so as to prevent the sides of the flipper part moving during moulding of the channels 3, 3'; 4, 4'.

The advantages resulting from the flipper described will be self-evident. The channels 3, 3', 4, 4' with opposite concavities allow:

- a) improved channelling of the flow of fluid in both directions of flipper stroke, and
- b) excellent bending of the flipper in both stroke directions.

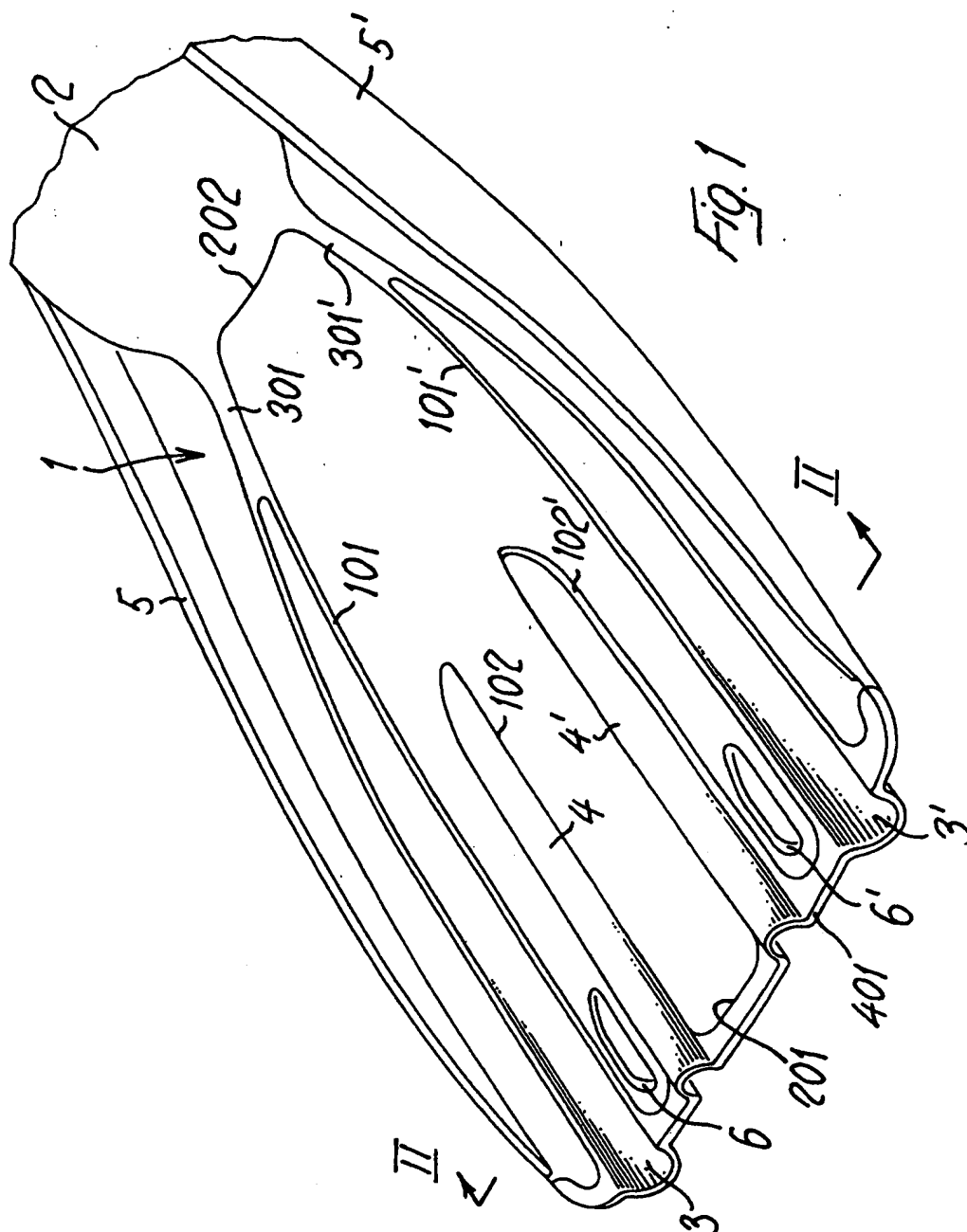
As illustrated, the central channels 4, 4' are narrower than the side channels so as to further limit the "elastic yielding" of the flipper part 1 during swimming.

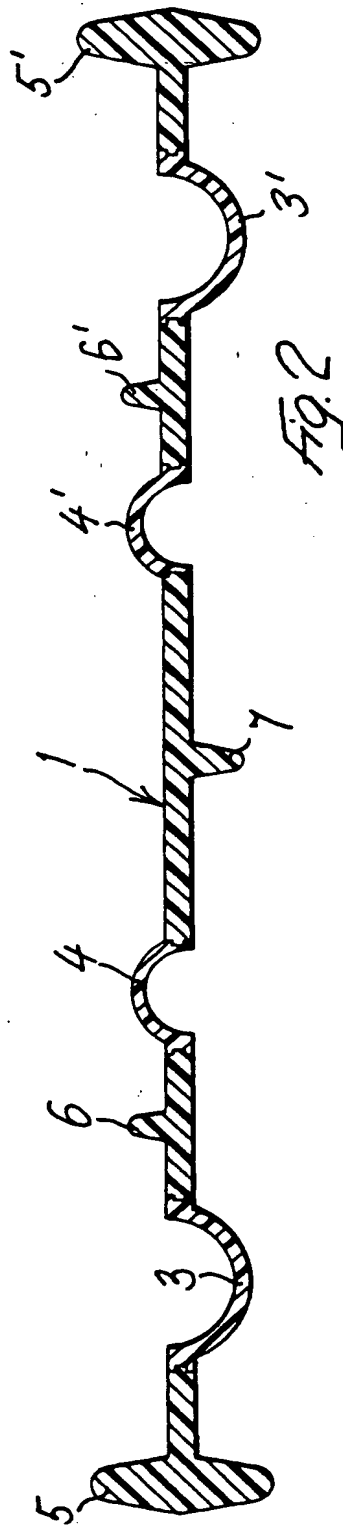
Figure 3 shows a variant, three-channelled embodiment of the flipper shown in Figures 1 and 2. According to this variant, the flipper part 1 has a single channel 4'' at its centre, this channel having an opposite concavity to that of the side channels 3, 3', for the same purposes as those described with reference to the four-channelled flipper.

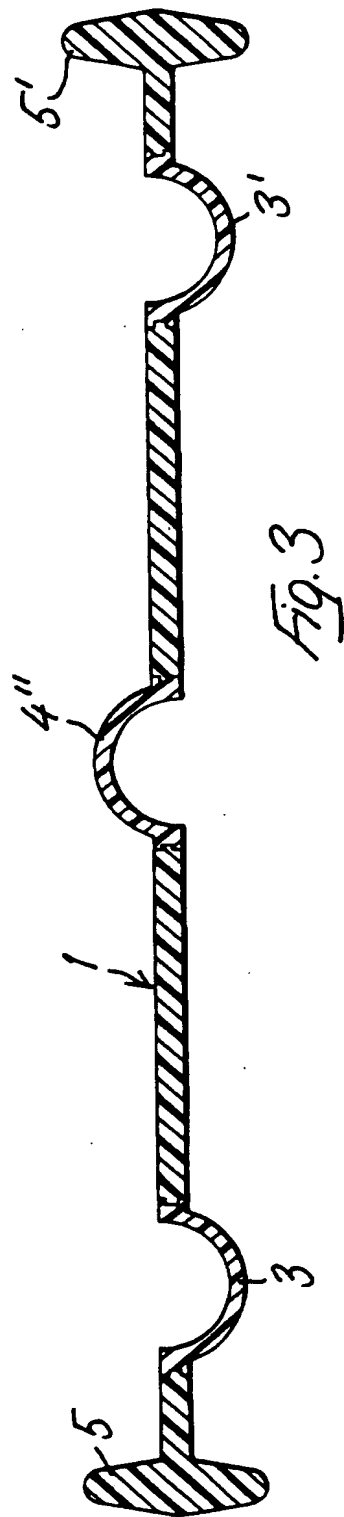
## Claims

1. Swimming flipper of the type in which the flipper part has at least two or more channels for restricting and directing the streams of fluid generated during swimming, characterized in that said channels are made with opposite concavities.

2. Flipper according to Claim 1, characterized in that it has a first pair of side channels (3, 3') and a second pair of central channels (4, 4'), said central channels having opposite concavities to those of the side channels. 5
3. Flipper according to Claim 2, characterized in that said central channels are narrower than the side channels. 10
4. Flipper according to Claim 1, characterized in that it has a first pair of side channels (3, 3') and a central channel (4"), said central channel having an opposite concavity to the concavities of the two side channels. 15
5. Flipper according to Claims 1 to 4, characterized in that it has a series of small projections or fins (6, 6', 7) located on those areas of the flipper part which separate the individual flow channels. 20
6. Flipper according to any of Claims 1 to 5, characterized in that said flow channels are obtained by moulding a relatively soft material inside a series of slits formed in the flipper part, which is made of relatively rigid material, of the flipper. 25
7. Method of manufacturing a flipper comprising two side channels and at least one central channel according to Claims 1 to 6 above, of the type consisting of a flipper part made of relatively rigid material on which a shoe part, made of softer material of the consistency of rubber, is moulded, said method comprising: forming a series of slits in the flipper part which consist of two side slits and at least one central slit which extend from the leading edge of the flipper part in the direction of the base part thereof; forming a series of injection channels in said flipper part which extend from the base area of the flipper part as far as the rear ends of the two side slits of the flipper part; injecting a material for forming said flow channels into said side slits, via said injection channels; directing the injected material along the leading edge of the flipper as far as said central slits, with said material running into said central slits, thereby forming said central flow channels. 30  
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8. Method according to Claim 7, in which said flipper part has, at least in the areas separating said slits, a series of projections which can be inserted into corresponding recesses in the mould so as to prevent the end parts of the flipper part from moving during moulding of 55
- the channels.
9. Method according to Claim 8, in which said projections are in the form of small fins.
10. Flipper according to Claims 1 to 6, obtained using the method according to Claims 7 and 8.









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## EUROPEAN SEARCH REPORT

Application Number  
EP 93 12 0043

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.5)
X	FR-A-2 355 529 (BEUCHAT)	1,4,5	A63B31/11
Y	* page 2, line 13 - page 3, line 25; figures *	6,7,10	
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Y	EP-A-0 308 998 (AMF MARES S.P.A.)	6,7,10	
	* column 2, line 33 - line 48; figures *		
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X	FR-A-2 332 038 (DESSAULT)	1	
	* page 4, line 22 - line 26; figures 1,5,6 *		
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A	FR-A-2 115 724 (FORJOT)	1,5	
	* page 2, line 28 - page 3, line 26; figures *		
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A	FR-A-2 494 588 (LECAT)	5	
	* claim 1; figures *		
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A	FR-A-1 296 314 (MAZZELLA)	1,5	
	* page 1, left column, last paragraph - right column, paragraph 2; figures 6,7 *		
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A	EP-A-0 436 927 (TECHNISUB S.P.A.)	6,7	
	* abstract; claims 12,15; figures *		
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The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 22 February 1994	Examiner Jones, T
<b>CATEGORY OF CITED DOCUMENTS</b>			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ----- & : member of the same patent family, corresponding document	

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